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(54) ROTATING REEL GAME WITH MASKING SHUTTER

- (71) We, BALLY MANUFACTURING CORPORATION, a Corporation organised under the laws of the State of Delaware, United States of America, of 2640 West Belmont Avenue, Chicago, Illinois 60618, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention pertains to amusement and game apparatus of the type having a set of symbol-bearing, score-award-determining reels and score-award selector switch means cooperative therewith, together with reel spinning mechanism operative in cycles, and control circuit means including master control means operative to free the mechanism for one cycle of operation to spin the reels and index the same in various symbol-displaying and score-award determining positions in which different possible award circuits are established through said selector switch means in correspondence with certain of said index positions, and score-award means governed by the award circuits for actuating an award counter or register.
- This invention pertains to permutation and combination apparatus of a kind in which symbol-bearing reels are set into rotation and caused to come to rest in variously changed relative indicating positions with the object of displaying different combinations of the symbols or some score indicia or the like arranged about the peripheral parts thereof, such apparatus being employed, for example, in amusement and game devices which may include a score-award means controlled by sensing and selecting devices governed by the various positions of the reels.
- Such apparatus commonly employs three reels and mechanism for rotating the same actuated by a manual lever means operative to set the reels into motion for a single cycle of operation subject to the necessity of first releasing some form of master control or lockout, as by operation of a switch or coin-control.
- In accordance with the invention, at least one particular reel, and preferably a *fourth reel* added to the usual three, constitutes what may be referred to as a *feature reel* or reels, and is provided with shutter means movable to and from a normal symbol-masking position relative to the said particular reel or reels, and biased yielding to move from said normal position to a released non-masking position; shutter reset means co-operable with said spinning mechanism operative to reset the shutter means automatically from released to normal position during an initial phase of each operating cycle; releasable latch means automatically operative to latch the shutter means in normal position on resetting thereof; and shutter release means operative to free the shutter means for movement from normal position as aforesaid.
- In a preferred embodiment, the apparatus may provide mechanism for spinning all of the reels at one time, whatever their number, in each of two operating cycles, and likewise actuating the appertaining award and score-sensing means for all reels in each cycle, subject to the condition that a master lockout or control must first be operated or released in order to initiate the first operating cycle with such lockout or control automatically conditioned to free the apparatus for the second cycle as the result of a score or like award condition achieved in the first cycle.
- In those conditions in which the shutter has been released in one operating cycle, the mechanism is contrived to reset and releasably latch the shutter automatically in the masking position during the initiation of the next cycle. An electromagnetic latch-releasing means and releasing circuit are provided for the shutter which are automatically actuated in the second cycle of operation through the agency of certain award or score circuit means set up in the said first cycle.
- It is further provided that the withdrawal of the shutter from the masking position, when the latching means is released, shall have a slow rate co-ordinated with the rotation of the fourth reel in a way to fully reveal the reel indicia or symbol displayed by

the special fourth or extra reel substantially at the moment of its coming to rest.

Hereinafter the invention is described by way of example and with reference to the accompanying drawings wherein:

Figure 1 is a front elevation of a four-reel mechanism according to the invention;

Figure 2 is a fragmentary elevation of the right-hand side of the machine seen in Figure 1;

Figure 3A is a fragmentary cross-section of the same side of the machine of Figure 2 but in a different plane showing parts of the reel-spinning and sensing mechanism in elevation; the view shows the parts prior to the machine being cocked;

Figure 3B is a view similar to that of Figure 3A but in a different plane again and with parts shown in cocked condition;

Figure 4 is a side elevation, to reduced scale, of the side of the machine opposite from that seen in Figure 2, 3A and 3B; the views shows the parts before cocking;

Figure 5 is an elevational view, with parts shown in section, of the shutter means, resetting and releasable latch means and co-operative parts of the associated reel-actuating lever system as viewed in the direction of lines 5-5 of Figure 1;

Figure 6 is a plan view of the reel holding mechanism; and

Figure 7 is a pictorial schematic and circuit diagram illustrative of the operation of one form of the apparatus.

As depicted in Figure 1, the reel apparatus may comprise the conventional set of three reels 10, 11 and 12 modified, however, to include a fourth or feature reel 13, all arranged to spin about a common axis on a shaft 14 removably seated atop a chassis structure 15. All four reels, as well as the mechanism for spinning, arresting, and sensing the same, may be substantially in the known form disclosed in U.S. Patent No. 2,579,241 to Nicolaus, only so much of which is reproduced and described herein as is deemed necessary to an understanding of the purposes construction, and mode of operation of the novel fourth-reel features and associated award control and circuit means comprising the present invention.

A reel-spinning or operating cycle of the device is effected upon release of some form of a master control and lockout means (hereinafter described) and actuation of the manual operating lever 16, in consequence of which mechanism such as shown in Figures 2, 3A and 3B will activate the reel system beginning (Figure 2) with a counterclockwise motion of gear sector 30 transmitting effort through gear sector 31 and rod means 32 attached to a cocking lever 33 floating on the cross shaft 22. The latter shaft is turned clockwise as the result of the rocking of an

associated trip lever 34 fixed on said shaft by lever 33 via the agency of a trip-out cam 33A mounted on lever 33 and abutting lever 34. The shaft turns far enough to cause the tail of the cam to strike a tripping lug 35 on the chassis, at which point cam 33A is tripped and lever 34 is released.

During initial (clockwise) or cocking motion of trip lever 34 (toward the dotted-line position) associated spring 37 is tensioned, and when the coupling cam 33A is tripped out, lever 34 abruptly reverses its direction of movement and begins its return working (counterclockwise) stroke to turn the shaft 22, on which it is secured, independently of the cocking lever 33, the latter returning slowly under restraint of the air dashpot 36 to its starting position where the tripping cam 33A is reset.

As a result of the aforesaid cocking of the shaft 22, the lever systems shown in Figure 3A and 3B are activated. Thus, referring to Figs. 3A and 3B during the cocking operation shaft 22 initially rotates clockwise to cause in respect of each reel a spinning lever 17C to project its upper end into one of the variable-depth selector slots 19 on selector disc 18 by virtue of the fact that each said spinning lever is coupled through a spring and lost motion linkage to a respective plate 22' which is fastened to the shaft 22. The selector disc is coaxially rotatable with an associated reel, and therefore this action turns the reel slightly by reason of the pitch of the slot so that when the lever 17C is rapidly withdrawn as happens thereafter when the lever 34 is released and is returned rapidly to the starting position by means of spring 37 the reel will be caused to spin. At the same time during the cocking operation a corresponding selector or detecting lever 42C is turned clockwise to withdraw its detecting finger 41C from the particular reel slot 19B in which it happens to be engaged when the respective wheel is at rest in order that the reel may be free to spin.

Associated with the sensing lever 42C is a pivotally connected toggle lever system comprising a pair of toggle levers 20 and 21 which straighten out in substantial horizontal toggle alignment when the lever 42C is turned fully clockwise and are so held by a corresponding trigger lever 50. Lever 50 has a notched end which engages beneath the end 21A of the appertaining toggle lever 21. The effect of straightening this linkage is to cause the lever 42C to be momentarily held in its fully clockwise position.

Meanwhile, as lever 34 is released by the cam 33A tripping out, the spinning lever 17C rocks reversely (clockwise in Figs. 3A and 3B) about it to disengage the slot 19A abruptly, and in doing so imparts a moderate spinning impetus to the disc 18 and the associated reel; and after a short delay the

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toggle trigger 50 will be rocked to break the holding toggle 21 and free the detecting finger means 41C for entry into some one of the disc slots 19 to stop the disc (as at 19B, Figure 3A) and thereby determine the resting position of the associated movable selector contact means 46C on the corresponding contact bank 45C.

The delayed action of the toggle trigger means is achieved through the mechanism shown to reduced scale in Figure 4 (depicting the opposite side of the chassis from that seen in Figure 2) at which the opposite end of the cocking shaft 22 is seen to be keyed to a lever 24 connecting through a long drive link 25 called hereinafter the timer link bar to another lever 26 fast on a timer shaft 27 to which is also affixed one of the timing gears 28 of a known type of unidirectionally operating timer unit 29 operative to maintain the return or counterclockwise motion (as seen in Figures 3A, 3B) of shaft 27 at a slow rate.

As timer shaft 27 turns slowly, a coupling lever 38 affixed thereto (there being one of these levers for each reel), Figure 3B, moves its offset coupling flange 38A ahead of the timing lever 39 thereby permitting the latter and the associated drive bar 40 to move slowly back toward the right in the Figures 3A and 3B until the end of the long slot 40A engages and moves a trip pin 52 on the toggle trigger 50 to break the toggle as aforesaid.

It is to be understood that each of the four reels has associated therewith one of the selector discs 18 as well as a corresponding triggering and sensing lever means 17C, 20, 21, 50 etc., such as just described, it being observed here that by the simple device of having the respective long trigger slots 40A in the several timer-link-bars made in successively increasing length, the release of the four sensing levers 42A . . . 42D, and therefore the resultant stoppage of the respective reels, is caused to occur in sequence from left to right, the reel 10 stopping first, and so on with the fourth reel 13 being the last to come to rest.

In accordance with the preferred mode of operation, the fourth reel is always set spinning along with the other three, although it will normally be rendered non-indicating and relatively ineffective so far as display and scoring possibilities are concerned, except in the special case where the first three reels happen to set up certain special award conditions and circuits which will condition a fourth reel means for viewing and for providing an effective scoring operation in an ensuing "second" or "award" cycle operation.

Referring to Figure 1, the indicia symbols carried by the respective reels will be of any desired character suitable to whatever amusement, game or functional purpose may be

involved, such symbols being read or viewed from left to right horizontally at a particular position referred to as the viewing or index position. Usually the apparatus will be housed in some form of cabinet (not shown) concealing the mechanisms but provided with a window or sight opening aligned with said index position and represented in Figure 1 by the field of view 48 enclosed by dash-dot lines, it being observed that the indicia on the fourth reel 13 is obscured from view by a masking means in the preferred form of a curved plate 60 constituting a shutter which is carried at the end of a radial shutter arm 61 pivotally supported on the common reel shaft 14 at a position in between the third and fourth reels.

As will appear more fully hereinafter, the shutter 60, at the beginning of each operating cycle is automatically moved into the elevated, full-line masking position seen in Figure 1; but under the special award or scoring conditions previously alluded to and in which the fourth reel becomes involved the shutter will be caused to drop slowly to the non-obscuring or non-masking reading position shown in dotted lines in Figure 5 to reveal the indicia displayed by the fourth reel at the index position, along with that displayed by the other three reels.

The aforesaid shutter mechanism is shown in greater detail in Figure 5, wherein the shutter carrier lever 61 is seen to be pivotally supported on reel shaft 14 in a preferred location in between the third and fourth reels (Figure 1) said shutter carrier lever being adapted to rock freely up and down in the vertical plane between the said reels.

The shutter extends at right angles to the body of the shutter lever or carrier, and is attached to the latter as by rivets 60A. It lies closely across the face of the fourth reel to mask the indicia thereon. The carrier is normally maintained in this blocking or masking condition at the index position, as aforesaid, by an electromagnetically releasable latch means which may take the form of a keeper member 62 of Nylon or the like, (see Figure 5) riveted to the lower arc of the shutter carrier lever 61 and having a latching projection 62A extending radially toward the offset end portion 63A of a latching armature 63 forming part of an electromagnet in which said armature is normally pulled by spring 64 to thrust said end 63A into the path of the shutter latching projection and prevent the shutter lever from being pivoted downwardly by a force, such as gravity or a spring means (the former being utilized in the illustrative embodiment) and into the withdrawn, dotted-line, release position indicated, it being evident that energization of the coil 65 will attract the latching armature and free the shutter lever for such movement.

Also floating freely on the main reel shaft 14 adjacent the shutter carrier lever is a reset pawl 66 having an offset end portion providing a pawl 66A aligned with a like offset tappet formation 61T on the shutter carrier lever such that the two opposing offset pawl and tappet portions will be brought into abutment when the reset pawl 66 is pivoted clockwise, as by an upward movement of the long reset link 67 which is pivotally connected to said reset lever at 67A, and having a keyhole slot 67B at its lower end removably engageable with a stud 38B on the timer coupling lever 38 for the fourth reel (Figure 3B also).

When the shutter 60 is latched in the normally elevated masking condition of Figure 5, the reset pawl 66 stands as seen in full lines in this view displaced counterclockwise owing to the normal position of the timer coupling lever 38 and lowered condition of the reset link 67, but importantly the reset link 67 will move upwardly, and the reset pawl 66 will pivot clockwise, as a result of the clockwise movement of the lever 38, at the beginning of each operating cycle to bring the pawl portion 66A into downwardly pushing engagement with the carrier tappet portion 61T and thereby elevate the carrier 61 and shutter 60 to the masking position in which the same are automatically latched as aforesaid, this resetting operation occurs during the first portion or cocking phase of the cycle, it being important at this juncture to recall that during the terminal or spinning portion of the cycle the timer shaft 27, and therefore the timer coupling lever 38 and the reset link 67, move only slowly back to the starting position with the result that the reset pawl 66 likewise withdraws only slowly from the latched up shutter tappet during this latter phase of the cycle, in consequence of which it will be appreciated that if the latch release coil 65 is energized about the time the reset pawl begins its slow descent, the shutter will be released, but will be permitted to move toward withdrawn or non-masking position only slowly; and since it is during this latter phase of the operating cycle that the reels are set rotating, the total effect to the person observing the index viewing window 48 is that of the fourth reel and its symbols turning and coming to rest while the shutter slowly withdraws, the timing being desirably such that the shutter finally exposes the full view substantially at the moment the reel stops and displays a symbol at the reading position, all in a manner to afford an air of suspense and anticipation as to what the fourth reel score or award will be.

Owing to the normally counterclockwise lowered condition of timer lever 38, Figure 5, it will be apparent that the reset pawl 66, and therefore the shutter 60, will remain in the

lowered condition at the conclusion of any operating cycle in which it has been released, and will continue in this condition until such time as a new cycle is initiated, and be restored to masking position as a function of the initial or cocking phase of such new cycle.

In accordance with another known aspect of the conventional three-reel type of machine disclosed in the aforesaid Nicolaus patent, a means is provided for holding any particular one of the three reel in its spun position by actuating a switch to energize any of the three holding coils 54A, 54B, 54C, one of which is associated with each of the first three selector arms 42C, as seen in Figures 3B and 6, for example, the latter view showing the holding coils and mechanism for all three principal reels, it being observed that the fourth reel selector switch lever is not equipped with any holding means.

The operation of the holding means for any of the first three reels is such that whenever one of the holding coils, for example the coil 54C associated with the third reel, is energized its plunger 53C will be attracted to move the corresponding blocking lever 56C clockwise in Figure 6, and dispose its blocking end portion 56C¹ across the selector guide slot 57C in a subassembly chassis plate on which the entire array of selector switches 45C is mounted (see Fig. 3A), in consequence of which the associated selector lever 42C will be blocked from returning to its starting position from any prior award-detecting position it occupied on the stationary contacts 45C. Each blocking lever 56C, etc. thus displaced, will be retained in the holding position by the end 58C of a corresponding bell crank which has an opposite end portion disposed for engagement by a pin 59C on a common reset bar 59 which will be shifted toward the left, Figure 6, responsive to energization of its resetting solenoid 53, as described later shown in dotted lines in Figure 6 and in full lines in Figure 3B, situated beneath the subassembly chassis plate and reset bar 59.

For the purpose of illustrating one mode of operation of the novel shutter means in conjunction with reel apparatus such as disclosed in the aforesaid Nicolaus patent, the schematic diagram of Figure 7 depicts a simplified control circuit in view of which three basic award conditions will be described, namely, no award whatever, a *nominal* award resultant from the operation of the three principal reels; and the special or *feature* award by which the machine is automatically conditioned for operation a second time, without necessity of actuating the master control means, whatever its character, for the purpose of spinning the special fourth reel.

Assuming with reference to Figure 7 that a

normal cycle of operation is initiated by actuating the master control switch 70, either manually or by the intermediary of a token or coin element, with resultant closure of the contacts of the switch 70 to energize the coil 71 of a "Start" Relay, with simultaneous energization of coil 73 of the lockout release means. As a result of the closing of relay contacts 72, there is established a master power circuit from power supply terminals L-1, L-2 to the general circuit terminals 78 and 79, the latter terminals being represented by conventional negative and positive polarity symbols merely as a diagrammatic convenience to indicate a current source, whether alternating or direct current.

The "Start" relay will hold on throughout the operation until dropped by a resetting pulse, but in the usual way the actuating lever 16 can be operated only once for each operation of the master control by reason of pawl 74 co-operating with a corresponding rack and the holding circuit for coil 73 set up at contacts 77, this circuit being broken at supervisory switch contacts 76 by movement of the drive rod 32 or other member of the reel-spinning mechanism, thus releasing pawl 74.

As a result of pulling the lever 16 a first time in such a "master-released" cycle, all of the reels 10 to 13 will be caused to spin and thereafter be indexed in the normal way in their respective indicating positions with the respective symbols or score indicia thereof arranged in any of the many permutations and combinations possible (for example, each reel may have as many as twenty symbols about its periphery), such spinning and indexing action being effected through the operation of the spinning lever means 17 and indexing and detecting finger means 41, and selecting-switch means 45, 46, as previously described.

The initiation of any spinning operation, as aforesaid, automatically causes the shutter means 60 to be moved by the timer shaft link means 67 and releasably latched by armature 63 and catch 62 in masking position (should it be in released condition at the time) before the reels are set into motion by trigger lever 50 as the result of the operation of the spinning and indexing mechanisms described in Figures 2 to 4. At the conclusion of the spinning action, when the last of the four or other number of reels is indexed in the new display position, only the symbols on the principal set of three reels 10, 11 and 12 will be exposed to view, it being understood that at this stage not only is the displayed symbol of the special fourth reel 13 obscured or masked, but the appertaining selector switch means 45D, 46D is in effect disabled and takes no part in the normal score-evaluating and determining operation of this first master-released cycle.

Illustrative of the case in which no award or score whatever results from such a cycle, it will be assumed that, as the result of the aforesaid operation of the three principal reels and the associated value-sensing means, the appertaining selector switch wipers 46A, 46B, 46C fail to lodge upon any combination of stationary contacts on panels 45A, 45B, 45C capable of completing any award circuit whatever, in consequence of which it may be said that such operation or cycle is in effect terminated when the last of the three reels of the principal set comes to rest, the fourth or feature reel (or whatever its number in the total array) continuing ineffective and being covered in the absence of any award determined by the other reels, and accordingly any further operation of the apparatus would necessitate another actuation of the switch 70 or other master control means.

Operation commences with the actuation of the master control and lockout switch whereby the contacts (70) thereof are momentarily closed. The closure of these contacts causes the energization of the release coil 73 in respect of pawl 74 and the start relay winding 71 and the consequential closing of contacts 72 of this latter relay which is of the latching type. With the closing of contacts 72 power is applied on one side of contact 76 and a hold circuit is completed to provide further energization of the release coil 73. The energization of coil 73 causes pawl 74 to release the operating lever 16. When the latter is pulled contacts 76 are opened thus de-energizing coil 73 and releasing pawl 74 to once again engage with the operating lever 16 and thus disable it until the end of the existing cycle of operation when the power through contacts 76 is again restored by displacement of the rod 32 to its starting position (towards the right as shown in Figure 7).

Every ordinary reel-spinning cycle concludes with an operation of an End Cycle switch means 80, by means of cam 25A, which operation will trigger a cycle of operation of a score motor switch means 83 and 86-89, thereby totalizing the score or effecting a payout, as by operating a score register. In the case of every normal or ordinary award, the score motor means operates, as in the illustrative embodiment of Figure 7, to pulse a score register means a number of times dependent upon the value of the score or award. However, as described later when the special feature is awarded, the contacts 80 are disabled thus suspending the operation of the score motor means. The score motor operation is then permitted to go forward only at the conclusion of the second reel cycle, unless the player elects to reject the feature and accepts the original award.

Considering next the case of an ordinary or nominal award, again assumed to result from

a normal reel cycle involving operation of the Master Control switch 70, as in the preceding example, but with the difference now that an award-determining chain circuit will be set up from a master power transfer terminal 79 conductors 79A, 79B and 79C and interconnections variously effected by the selector switch wipers 46A, 46B and 46C lodging on appropriately connected stationary contacts in the banks on panels 45A, 45B and 45C, whereby to provide power connections at award terminals such as 81A, 81B, 81C and 81D on the third panel. Every award, including that presently described, will provide power on terminal 81A for operation of a master award relay -A- and one or more "value" or pulsing relays such as -B-, -C-, -X-.

Award terminals 81B and 81C are respectively connected to energize the coils 82B and 82C of two of the "value" or pulsing relays -B- and -C- (of which there will usually be a larger number than shown to afford a wide range of score values), each such relay when selected being effective to connect a pulsing switch means of certain pulse value to a score register.

It will be assumed that the award in this instance is such as to connect selector terminal 81B to actuate the *nominal* relay -B-. When the power circuits are finally completed in what may be termed the totalizing phase of the cycle, which is to say when the timer link bar 25 returns (toward the right, Figure 7) to its rest position, substantially at the time the last reel (13) is indexed, so that cam formation 25A will actuate a one-way "End Cycle" switch means to close contacts 80 and thereby start the score motor 88 by earthing one end of the motor winding, the other end thereof being connected to one of the master power terminals. An award cycle then commences by virtue of a circuit established from the earth connection through conductors 79A, 79B and 79C, terminal 81A, and thence through motor cam switch contacts 83, closed, to the coil 84 of said A-Relay, the latter being energized immediately upon initial motion of cam 86 when the motor starting pulse from the End-Cycle Switch 90 is applied to motor winding 88: the latter is energized for the full cycle of said cam owing to the closure of cam switch contacts 87, which contacts open to stop the motor when the cam completes one revolution.

As the result of a particular chain award circuit set up by the selector switch means 45A, 45B, 45C; 46A, 46B, 46C, the *nominal*-award relay -B- is selected and as a result of the closure of contacts 85 on the A-Relay, the coil 82B of the B-Relay will be energized for the duration of the motor cam switch cycle and will hold closed its relay contacts 90 to connect the pulse switch contacts 91, via conductor 91A to the step-up coil 92 of a known type of score register having a rotary ratchet disc 93 advanced from a spring-returned starting position by a ratchet pawl actuated by coil 92 in the known manner. Thus the score register stepping coil 92 will be pulsed through contacts 91 when the motor cam switch is cycled to cause the B-Relay to become energized as aforesaid, and it may be assumed in this instance that the concurrently rotating pulse disc PB of the appertaining pulse unit will provide five pulses, thus advancing the score register ratchet disc (and switch, if employed) five steps to indicate or give effect to the particular score achieved, at which juncture the described operating cycle producing only a *nominal* award may be considered at an end, it being understood that the score register may be restored to a zero or starting condition as described below.

The score register coil 92 also actuates a rotary switch means 94 via a ratchet drive 93 for the purpose of energizing any desired collateral award device; for example to illuminate score or value lamps 95 or the like. The score register is restored to a starting position responsive to energization of a reset coil 96, in a known manner, for example, by the closing of contacts 125 by motor driven cam 89. The resetting pulse provided by contacts 125 is also employed to energize the resetting solenoids 53, 75, 96, 109 and also a release coil 115 for a recycle relay 112.

When a normal operating cycle of the reel apparatus results in a *nominal* award accompanied by award of the special fourth-reel feature, the operation of the award circuits, including the said selecting-switch means, cam-cycle switch 83, score motor 88, and pulsing switch 91, 98, 99, will be exactly the same as in the preceding description of the *nominal* ordinary award operation up to the point at which the A-Relay is selected, at which juncture a Special Feature (SF) relay will be simultaneously operated by power applied through the selector-switch master award terminal 81D to coil 100. Energization of coil 100 open-circuits normally-closed contacts 101 and thereby disconnects power terminal 79 from the common transfer grounds -G-, the principal effect of which is to disable temporarily the End-Cycle switch 80 which also connects to this transfer ground -G-. Under the latter conditions, it will be evident that as the result of this special award the score motor, ordinarily triggered by switch 80 at the end of a normal reel cycle, will not be cycled, and the totalizing or score effecting operations will be suspended pending the player's decision to accept the *nominal* award or try to improve the award by a second-cycle operation.

Another result of operation of the SF relay, as aforesaid, is the enabling of the option switch circuits by closure of SF relay contacts 103, to connect power via conductor 103A to the "Accept" and "Recycle" option switches, via the contacts 107 of the cutout relay 106.

Assuming that the player elects to accept the nominal award and forgo the *feature*, he will push the "Accept" switch button to close its contacts 104 and thereby apply, via conductor 104A, a starting pulse directly to the score motor winding 88, thereby effecting the suspended totalizing cycle, causing the A-relay to pull in with closure of contacts 85 of the latter applying power via conductor 85A to complete a power circuit for such of the pulse relays as may be enabled by the selector-switch award, in this example, again, the B-relay, with resultant closure of relay contacts 90 and application of the award pulses from contacts 91 applied via conductor 91A to the stepping coil 92 of the score award register and the collateral award device 93, 94, 95, etc.

However, if the player, instead, elects to actuate the "Recycle" switch means, closure of contacts 110 thereof will, via conductors 110A, 110B pulse all three of the selector-switch Coils 54A . . B . . C to cause a lock up of the respective award positions occupied at this time by the sensing fingers and selector switch wipers of the first three reels and hold this original award in abeyance.

The same pulse on conductor 110A will energize the coil 112 of the Recycle relay, which is of the self-locking type (and which may be released by means such as the release coil 115), thereby closing contacts 114 to complete one leg of an operating circuit, via conductor 114A to a shutter switch 113, the remaining leg being completed via conductor 65A to the shutter release coil 65. At the end of the operating cycle, just prior to the indexing of the fourth reel, shutter switch 113 will be closed by a pin on the timer link bar 25 by virtue of the fact that the timer link bar is moving slowly (to the right in Figure 7) towards its end of cycle position. The closing of contacts 113 causes the shutter to be released which then completes its descent from normal masking position just as the fourth reel is indexed in symbol-displaying position.

Still another result of the actuation of the Recycle switch is closure of contacts 111 thereof to pulse, via conductor 11A the coil 106 of a Cutout Relay whose normal contacts 107, via conductor 107A, completes an enabling circuit from the -SF- relay contacts 103, conductor 103A, to the "Recycle" and "Accept" switches of the Option circuit by which the player is given the choice of accepting or rejecting the primary and feature

awards. Once either Option switch is operated, the option circuit is thereafter cut off or disabled until the machine is recycled by the Master Switch means to provide a master resetting pulse, as will appear more fully hereafter.

Assuming now that the actuating handle 16 has been manipulated in the second-cycle operation, and that the feature reel 13 has been indexed, any of three basic award conditions may result in that the nominal award of the first cycle may be lost, or it may be retained or it may be increased, these situations being next described in like order.

The entire award is lost whenever the fourth-reel selector switch wiper 46D fails to lodge upon any of the several possible combinations of contacts on its panel 45D to complete a circuit to a master award contact 117, with consequent failure to energize a transfer relay T, (such energization restoring the connection, at SF relay normally closed contacts 101 of power from terminal 79 to the "ground" terminal -G-) so that even though the fourth-reel selector wiper may also have lodged upon additional award contacts, neither the original award being held on the three principal reels, nor any additional award detected on the fourth reel unit, could be effected or registered due to the lifting of the Transfer Ground -G- by the SF relay and consequent inability of the End-Cycle switch to start a score motor cycle; and in this sense the entire award, whether original only or possibly enlarged, may be said to have been cancelled or lost.

Let it be supposed, however, that in the immediately preceding situation, the fourth reel selector switch wiper 46D lodges upon the necessary combination of contacts to complete a power connection to the master award terminal 117, but does not set up any supplemental or multiplied award whatever to other award terminals, such as 118; under such conditions the coil 120 of the transfer relay T will be energized from said master award terminal 117 to close its contacts 121 and reconnect power terminal 79 with the transfer ground -G-, so that when the End-Cycle switch 80 is actuated near the end of the second cycle of the reels, a starting pulse will be applied to the score motor winding 88, and the A-relay will be energized to actuate whatever pulse relays may be selected by the existing award held by the first three selector switches.

In the assumed example, an award is held on terminal 81B on the third panel, but none exists on the fourth panel; thus, when the score motor is cycled, pulse relay winding 81B will be energized to connect the PB pulse switch contacts 91 to conductor 91A and apply five stepping pulses to the Score Register coil 92, which is the same award that would have been effected had the

player accepted the original award instead of recycling for the feature reel operation.

5 Lastly, an example of an increased score award is given wherein it will be assumed that as the result of the first or original reel cycle score award, terminals 81A, 81B, 81C, and the master terminal 81D on the third panel are all connected in award circuits; and further, that the fourth reel selector switch means applied power to the master terminal 10 117 and to award terminal 118, so that when the End-Cycle switch 80 triggers the score motor cycle, award relay -A- and pulse relays -B- and -C- and still another award-multiplying relay -X- are all energized to connect their corresponding pulse switches 91, 98 and 99 to apply the number of pulses determined by the appertaining pulse cam discs PB, PC, PX to the conductor 91A and advance the count of the score register means accordingly.

15 In the illustrative embodiment, the several pulse switch cam discs PB, PC, PX have their respective pulse lobes in such numbers and relative angular spacing as to produce pulses occurring in relatively interspersed sequence. Thus the PB pulse switch produces five relatively widely spaced pulses; the PC switch produces five more spaced pulses which will be interspersed with the five produced by the PB unit, making a total of 20 25 ten pulses provided the corresponding relays B and C are operated at the same time. The PX pulse switch, alone, will produce 10 pulses; but if concurrently operated with either the PB or PC units can contribute to a total of 15 pulses; or if operated concurrently with both PB and PC would produce a total of 20 pulses. Such an arrangement can be varied and expanded and makes possible a flexible selection of large award values by combining pulse units instead of having a single unit used alone to provide a certain number of pulses only, it being observed that 30 only a simplified example is given here.

35 In order to reset the circuit means in the special situation wherein the entire score award is lost in the second-cycle operation because there is no circuit to ground existing anywhere, and therefore the motor starting circuit is disabled at End-Cycle switch contacts 80, a special resetting circuit is provided comprising contacts 116 of the recycle relay 112 which relay is energized 40 when the feature option is taken by the player, with the result that motor power is now again rendered available at the End-Cycle switch means via said contacts and conductor 116A through another set of contacts 80X, such that at the end of the second cycle said contacts will be transiently closed by the homing movement of the timer link bar 25 to pulse and start the score motor via conductor 104A, and the resultant cycling of said motor will produce no award pulses 45

since the transfer ground at selector switch panels 45A . . . B . . . C and D is ineffective owing to the operated condition of transfer relay T. At the end of the motor cycle, the resetting car switch contacts 125 will close to pulse all resetting coils in the manner previously explained and thereby cut off the power supply at the Start Relay in readiness for the next cycling operation under control of the Master Switch means.

70 It will now be understood that in every "second-cycle" or "fourth-reel" feature operation of the apparatus, the shutter means will be tripped out or released by the trip switch 113, actuated effectively in only one direction by a pin on the timer link 25 during the slow return of this member to its home position, as governed by the timer means 29; and the movement of the shutter toward non-masking or withdrawn position will be correspondingly slow and co-ordinated with the stopping of the masked reel, the indexing of which is also governed by such timer means.

75 Whether the lockout means for the actuating handle is freed by the Master Control means or by the feature recycling operations, every operating cycle concludes with a resetting operation effected by reset means including a reset cam 89 rotated by the score totalizing motor means 88 along with the cycling cam 86 and the several pulsing cams, said cam 89 having a lobe calculated to close contacts 125 of a reset switch substantially concurrently with the de-energization of the score motor 88 by cycle switch means 86, 87, thereby applying a resetting pulse to conductor 126 and the several resetting coils 53, 96, 75, 109 and 115, to reset or trip out respectively the selector switch holding mechanism, Score Register, Start Relay, Cutout Relay 106 and Recycle Relay 112.

80 The novel reel-masking shutter structure, and means co-ordinating the release and resetting thereof to the movements of a particular reel in a set, has been shown in conjunction with only one control and utilization circuit means, described by way of example and for purposes of illustration, it being understood that such circuit means may be modified and varied within the scope of the invention, and such exemplary arrangements are not intended to be limiting except as may be required by the appended claims. In particular more than one reel may be equipped with a shutter to operate similarly to that provided with reel 13.

WHAT WE CLAIM IS:—

1. Amusement and game apparatus of the type having a set of symbol-bearing and score-award-determining reels and score-

- award selector switch means co-operative therewith, together with a cyclically operating reel spinning mechanism and control circuit means including master control means 5 operating to free the mechanism for one cycle of operation to spin the reels and subsequently index the same in various symbol-displaying and score-award determining positions in which different possible 10 award circuits are established through said selector switch means in correspondence with certain of said index positions; and score award means governed by said award circuits for actuating an award counter or register, 15 characterized in that said apparatus further includes shutter means movable to and from a normal symbol-masking position relative to at least one particular reel of the set and biased yielding to move from said normal 20 position to a released non-masking position; shutter reset means co-operable with said spinning mechanism operative to reset the shutter means automatically from released to normal position during an initial phase of 25 each operating cycle; releasable latch means automatically operative to latch the shutter means in normal position on resetting thereof; and shutter release means operative to free the shutter means for movement from 30 normal position as aforesaid.
2. Apparatus according to Claim 1 wherein said shutter means is pivoted on a common shaft supporting said set of reels for rotation, and said resetting means comprises 35 lever means operated at the beginning of each operating cycle of the apparatus to restore the shutter to normal position as aforesaid.
3. Apparatus according to Claim 2 wherein said lever means comprises a resetting 40 pawl pivoted adjacent said shutter means on said common shaft to move to and from resetting engagement with a part of the shutter means and said resetting pawl is withdrawn by the action of a mechanism 45 associated with said reel spinning mechanism in each cycle from engagement with said part subsequent to latching of the shutter in normal position as aforesaid.
4. Apparatus according to Claim 3 wherein said reel spinning mechanism includes 50 a timing means co-operable therewith to regulate the rate at which said reels are indexed and the withdrawal of said resetting pawl from engagement with said shutter part is thereby co-ordinated with the indexing of 55 said particular reel such that the shutter is substantially fully withdrawn from masking position at the time said particular reel is indexed in symbol-displaying position.
5. Apparatus according to Claim 1 wherein the latch means includes a latching 60 part moved from latching engagement with a member on said shutter by the armature of an electromagnet, and said shutter release means includes a shutter switch operated under 65 control of said reel spinning mechanism and control circuit means in a predetermined timed relation in advance of the coming to rest of said particular reel in any indexing thereof. 70
6. Apparatus according to any preceding claim wherein said reel spinning mechanism includes a manual operating lever and 75 lockout means normally rendering said lever inoperative, electromagnetic release means operative to disable said lockout means; and said master control means includes a 80 lockout-release switch operative to actuate the electromagnetic release means to free the operating lever for a single actuation to initiate one cycle of operation as aforesaid.
7. Apparatus according to any preceding claim wherein said reel spinning mechanism includes timing means co-operable therewith 85 and effective to regulate the order and rate at which said reels are halted and further co-operable therewith to regulate the release movement of the shutter from normal position to fully reveal the symbol on said 90 particular reel substantially at the moment of the reel coming to rest, and wherein said latch release means is electrically actuated to release the shutter and said shutter release means is a shutter switch connected in 95 an operating circuit with said latch release means under control of at least one of said award circuits.
8. Apparatus according to Claim 7 wherein the operating circuit named therein is 100 enabled to operate the said shutter switch only by means of circuit connections established by said selector switch means in the second of two consecutive cycles of operation of the apparatus which operations 105 involve an award situation being carried over from the first to the second of such cycles.
9. Apparatus according to Claim 5 further including electrical circuit means controlled 110 by one of said award circuits in a first operating cycle of the apparatus initiated by operation of the master control means and establishing a special award circuit and circuit means controlled thereby enabling 115 operation of the spinning mechanism in a second cycle without operating the master control means and also enabling said selector switch means to establish further award circuits under control of the score-award determining movement of said particular reel in said second cycle; and further circuit 120 means controlled by said special award circuit for enabling said shutter switch to

effect operation of the shutter release means prior to indexing of said particular reel in said second operating cycle.

- 5 10. Amusement and game apparatus substantially as described herein with reference to the accompanying drawings.

For the Applicant:
LLOYD WISE, BOULY & HAIG,
Chartered Patent Agents,
Norman House,
105-109 Strand,
London, WC2R OAE.

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Fig.1

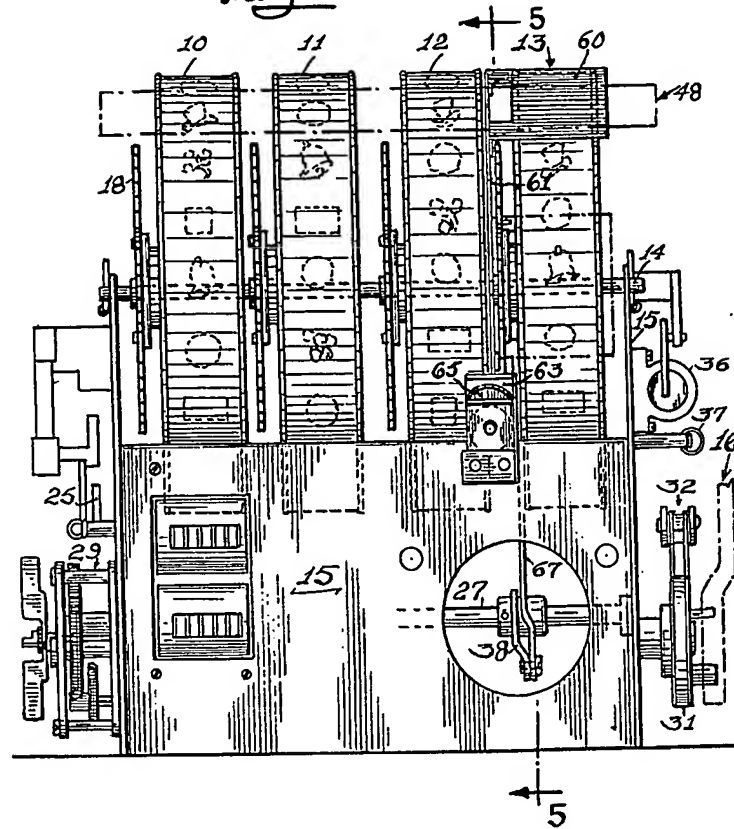


Fig.2

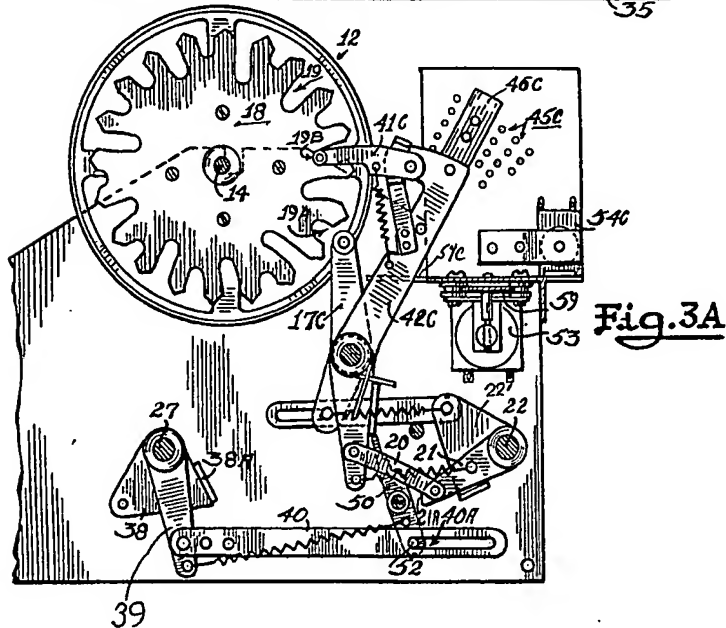
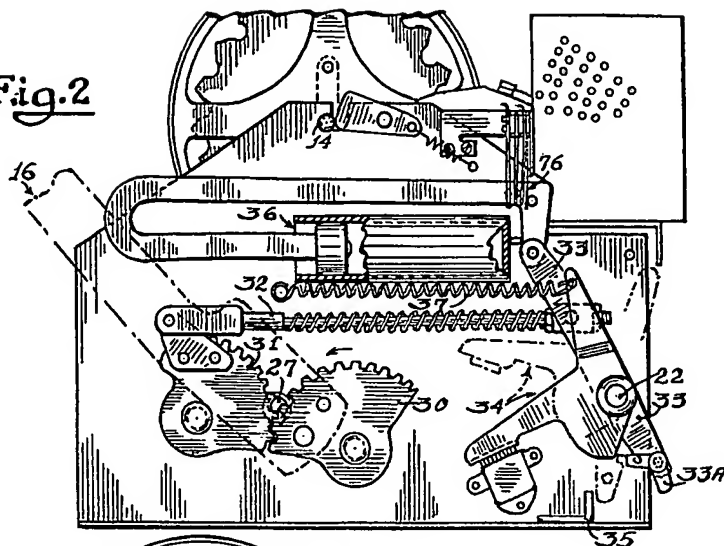


Fig. 3B

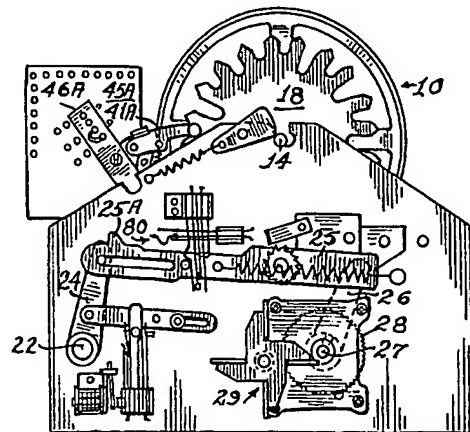
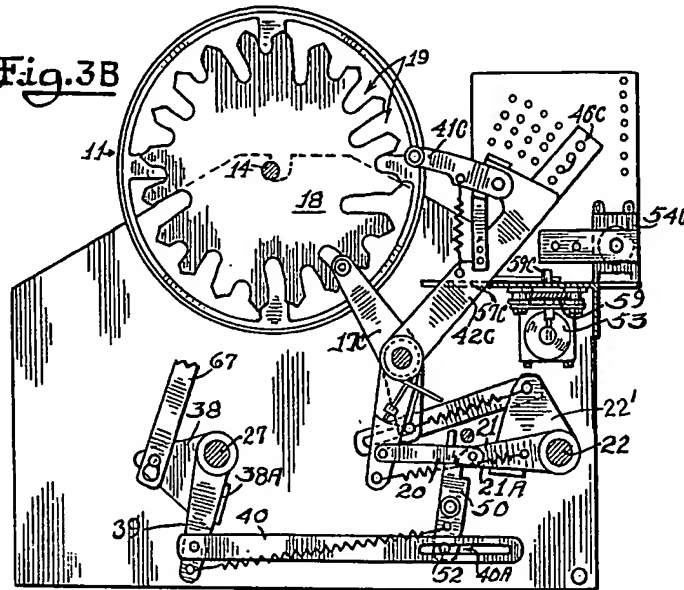


Fig. 4

